

CONTENTS

November 1983 Vol. 1, No. 1

Preface	3
Editorial	4
Michael Newby Some Philosophical Reflections on Tension in Performance	5
Andrew Steptoe The Relationship between Tension and the Quality of Musical Performance	12
Fred H. Hochberg, Robert D. Leffert, Robert J. Silverman Physicians' Views of Physical Problems	23
Ian James and Imogen Savage A comparison of the effects on musical performance of two methods designed to reduce situational anxiety	34
Nelly Ben-Or The Alexander Technique—its relevance to performance	39

SOME PHILOSOPHICAL REFLECTIONS ON TENSION IN PERFORMANCE

Michael Newby

There is only a degree of truth in the view that an academic breed, the philosophers, have specialised skills applicable to problems concerning musical performance. This is because every specialist, musician, psychologist, engineer or whatever engages in philosophical activity of a sort. Each is concerned to develop a perspective on the significance of the particular activity in which he is engaged, and to consider its inter-connections with other specialisms. Nevertheless the philosopher can bring analytical and synthetic skills to bear on a particular issue.

My concern here is to help clarify ideas associated with tension and to relate them to musical performance. Musical performance itself can only be understood as we consider the music itself, the musician as performer, his relationship to the work and by no means least, his self-consciousness.

I want to reflect on ideas of 'tension', fear and anxiety and the solution of these states in connection with musical performance. One of my central conclusions is that problems arising from tension, fear and anxiety are often the result of intrusion into the work and its execution by a distorted sort of introversion. The quest for mastery in music cannot be separated from control of self, which in turn cannot be divorced from knowledge of one's present and anticipated environment. The aspiring musician must be skilled in far more than the distinctly musical arts and sciences. By contrast, my other major conclusion is that the greatest therapy lies in genuine musical activity.

Firstly, a look at ideas of tension. The archetypal notion for us is 'pulling apart', as it applies, for example, to the strings of an instrument. This is a perceptual concept and as such, is not in its everyday sense, at all controversial or complex. Once its symbolic usage entered the vernacular and from there the language of arts and sciences, problems began to multiply. It became possible to speak of 'tensions' between ideas, between values or between symbolic forms of expression. The use of the word might or might not indicate something undesirable or unplanned. This term also lends itself to scientific usage, applying to social groups, economic forces, engineering, and most significantly for us, human physiology and psychology.

In these last two contexts tension might be physical, mental or both, might be conscious or unconscious, and might be considered desirable or undesirable. In one sense, tension can be understood in purely physical terms, having physical causes unrelated to the thought-life of the subject. Bad posture and technique may generate such tension, as can disease. It may not be easy to distinguish such cases from examples of anxiety displacement in which unconscious anxiety manifests itself somehow in muscular tensions and pain. In the latter case the therapist would look for independent evidence of anxiety in the subject. Examples of tension which have no connection with

fear or anxiety include: tension of the left foot when driving due to keeping it suspended over the pedal for long periods; neck-ache due to poor posture when reading; backache due to one's position when sleeping. Musicians who exercise their hands at great speed and with great precision can also suffer from muscular tensions which need have no connection whatsoever with anxiety. The relief of such tensions is a matter for the music teacher, physiotherapist, or physician. The **Alexander technique** relates to the prevention and cure of certain forms of this physical tension. I doubt its significance for the relief of other forms of tension, not because I have certain empirical evidence to call upon, but because it is apparent to me that 'stress' is a far broader and more complex phenomenon than that to which 'habitual reactions' relate. I do not intend to attack the Alexander technique—I am in no position to—but I do want to sound a note of caution about the danger of expecting too much from it. The danger is apparent in Nelly Ben-Or's account. She concludes:

"the destructive aspect of tension in performance can be eliminated to a very large extent and the Alexander principle, encompassing the whole person, will directly influence the details of his preparation for a performance.

A performer whose use of himself is well balanced will not be disturbed by undue tension of the kind which is the result of effort and strain . . ."

"What is important is the fact that within each one of us there exist sources of energy which can be used constructively and be channelled so that a great deal of usual mental stress and strain can be avoided, not only in artistic endeavours but also in all aspects of daily living". (1)

What I would question here on the one hand is the view that bad postural habits 'encompass the whole person' and on the other hand the view that 'techniques' can be broadly appropriate to relieve 'stress and strain' not only in musical performance but also in "all aspects of daily living".

What is meant by 'the whole person' in connection with the first? The answer appears to be "all our psycho-physical functioning" (2). As an answer, this is the best I can find in the paper cited. Carola Grindea is rather more specific when she cites "anxiety" and "insecurity" as causes of "muscular tension" (3). This led me to expect an account of the performer's attitudes towards himself, his future, music in general and the rest of his life. This I did not find. I read on about the physiology of piano-technique to find my hopes again kindled:

"After all, not only the body but also the mind should be free of tension . . ." (4).

The paper then led me on to an analysis of the causes and effects of tension. The distinction is made between "inner nervous tension", not at all peculiar to musicians and "muscular tension of the playing apparatus". As the author perceives, inner nervous tension relates to many aspects of the subject's life, none of which she has considered. I do not want to criticise this omission from a paper on piano playing: that would be foolish. Nevertheless, I believe that confusion can be created insofar as we find musicians

elevating certain techniques to the status of far-reaching theories of "tension" (which includes "anxiety") as does Nelly Ben-Or and focussing upon muscular tension to the exclusion of 'the whole person' as does Carola Grindea. By 'the whole person' is meant, I think, one's physical behaviour, conscious and unconscious attitudes and values, tacit pre-suppositions, conscious ideas and one's fears and anxieties.

It is important that we distinguish tension from anxiety. The former is grounded in physiological phenomena: its use in broader ways is metaphorical and can be confusing. The latter is grounded in the 'spiritual' life of the individual. By 'spiritual' I mean here the life of a conscious, reflecting, sensitive agent insofar as this develops in the context of a socio-cultural milieu. The spiritual life of a person grows out of many influences in the field of beliefs, hopes, values, fears and anxieties and whilst never entirely free from the heteronomy of such, becomes increasingly autonomous with increasing maturity. The spiritual life can, like the physical, become distorted and starved and thus regress or become fixated. Anxiety is not quite as specific as fear. Fear has a definite object of which the subject is usually aware. Generally speaking, 'anxiety' is used to refer to a less obviously object-related phenomenon which may or may not manifest itself in specific fears. Fear and anxiety can be as much an inhibiting factor in musical performance as is tension. Often, in fact very often, this is the root cause of physical incapacity.

What then do I say about tension? Is it a fly on the wheel? That is, I think, a matter for the individual musician to decide, but since musicians are human, it would be very odd if their muscular tensions were at the heart of their problems.

Fear and anxiety take many forms and have many degrees. For present purposes, I make the following distinctions:

- A. Fear of specific situations, tasks or objects, with its origin in past experiences of these things.
- B. Fear of imagined situations beyond one's experience to date. This includes a fear of failure as a musician.
- C. Anxiety, characterisable not in terms of situations but as a tendency of the personality, not only as musician, but in various areas of one's life. This may have genetic or childhood origins or both and is manifested for example, as a tendency to panic easily, to overwork and to be highly fastidious.
- D. Anxiety of development. This appears at a particular period in one's life and relates to an identity crisis. It is manifested as confusion about one's role in life, about one's acceptance by others, about the meaning and quality of one's activities. The musician may question his integrity and ability and find little relief in musical activity. He questions the significance of such activity. Anxiety of development is not simply about oneself as subject: it is about the 'world', for the dominant issue is about how one can participate. "How can I take part in life in a rewarding and fulfilling way?" This question is as much about reality as it is about oneself.

The resolution of these fears and anxieties cannot be by treatment in which the subject is a passive, non-comprehending recipient. This disqualifies suggestive techniques and the administration of drugs.

Whatever else they might be, techniques like that of Alexander are suggestive. They work partly, if not entirely, by the power of an authoritative suggestion of the form: "Your body is to be likened to . . ."; "Tension is the result of . . ."; "Do this and you will feel better in the following way . . .". The rationale is, at its clearest, mysterious and obscure. The defence relies purely on the testimony of some participants. If there is a connection between posture and tension, the method is likely to be effective in those cases where tension (as I have defined it) is the problem. It can only alleviate fear and anxiety by virtue of its illusory power, if indeed it can do so at all.

Drug treatment, such as its use to reduce nervous tension and muscular tension during musical performance, could 'bring an end' to all problems of the psyche. The price paid would, of course, be a certain degree of change in consciousness. I do not question the appropriateness of such treatment where either the suffering would otherwise be beyond bearing, or where the treatment does not interfere with the subject's faculties as a human agent. As a cure for fear and anxiety it is a short-term necessity. If the musician has problems underlying his tension it is shortsighted of him to rely on medication. This certainly applies to depressant drugs (5).

The treatment of fear and anxiety must involve the subject's own understanding and must stimulate him to reflection, reassessment and responsible action. His task is to identify specific fears and to overcome them by a variety of strategies. If some underlying anxiety is involved he must identify it and resolve its attendant problems. Usually this is only achieved with the help of a specialist who can enable one to identify one's own problems and offer guidance for overcoming them.

I particularly want to focus on anxieties of the 'developmental' type referred to earlier. My purpose is not to offer a cure but to show the direction we must take if such anxieties are to be overcome. The student of music, as well as the professional performer, is highly immersed in his work. He spends long hours at it; he places it high on his scale of values; 'musician' identifies him as a person more than any other name. He feels he must not fail to be the best that he can be. He is aware of the financial and career difficulties of all but the best. He works in an atmosphere of strong competition and incisive criticism, often emotionally expressed. Individualistic activity is inhibited in favour of professionalism and discipline. He hears constantly the praise of great musicians with whose work he is well enough acquainted to know that he does not possess their genius. In all these things 'brilliance' is the accolade that must be won. No wonder he cannot easily break away, go and relax, do something else, keep things in proportion.

At the root of all development anxiety (and also relevant to the generally-anxious person) is the loss of a balanced perspective on oneself, on other people, on values in life and on the value and meaning of music. Every attitudinal and emotional state involves some appraisal of the situation (6) and this is also the case with states of fear and anxiety. Similarly one's

continued self-assurance depends upon the discovery of a perspective on life, which one consolidates by reference to facts, ideas, opinions and values to which one is committed and which one calls to conscious awareness in order to keep irrational tendencies in check. Such tendencies may crowd in upon the musician as he finds himself thinking such things as "the meaning of my life depends upon my performance"; or "I am earmarked for greatness". Half the battle is to become aware of such tendencies in oneself, but the other half is to learn either to live with them or to leave them behind.

Two observations I think are pertinent to the achievement of a stabilising perspective; one relates to the notion of self-fulfilment, the other to the meaning of music.

It is I believe, a general rule, but not without exceptions, that the specialist is in great peril as long as he builds his life on his specialism. Not only is it healthy to have a means of diversion from the intense pressures of participation in one form of expression, it is also positively beneficial to the quality of the special work itself. Imagine the philosopher who lives only to philosophise: he has very little to philosophise about, except in a detached sense, remote from the human situation. Wittgenstein appears at first sight to be such a one for he was a most eccentric and austere person, one who reflected for hours at a time on specific details of logic. But if we look again, his disjointed works are 'full up' with observations on ordinary life, of human conversation of scientific, engineering, artistic and musical activities. As philosopher he 'fed' upon these things and his work was saved from idiosyncrasy through his participation in ordinary life as well as high culture. I believe this applies to the musician also whether performer or composer. There is some sort of vital connection between musical appreciation (or expression) and the further reaches of human life; and the same applies to drama, poetry, religion and fine art. Whatever this connection might be, it cannot be considered at length here (7), nor is it necessary to defend the claims in the face of exceptional cases which serve as counter-examples. Insofar as music bears no relationship to human experience of life, beyond itself, it is of purely internal significance as a technical exercise or experiment, like formal logic to the philosopher. The healthy musician is a social being with a variety of concerns outside music and with sensitivity to various forms of expression. Music is powerful in our lives because it is life-enhancing, being inspiring, evocative, expressive of felt qualities or depths in experience. The hermit or fanatic cannot make, appreciate or perform great music (8).

This has a lot to do with anxiety reduction, for one way of escape from pathological intensity of emotional involvement in one's success vis-à-vis one form of activity, is to develop a wider range of interests by participating in activities outside of them. Nevertheless, as I have tried to say this need not hinder the quality of one's musical achievement but, much rather, enhance it.

Finally, some observations on the meaning of music, insofar as it has bearing on tension, fear and anxiety in and about performance. Musical expression is not reducible, at least without remainder, to any other form of expression like, for example, linguistic discourse, mathematics, religious experience or visual art. Nor is its essence captured in terms of emotive response. The fascination of music for us may sometimes be interpretable

in these forms, but the interpretation loses something irreplaceable that can only be expressible musically.

Musical expression is not to be understood as a form of luxury, a playful gambolling on the green pastures of life. For the many, as well as the few, it is essential diet for the human spirit. Great music is profound without necessarily being complex. It is profound because it does not call us away from reality, but is part of reality. It sustains the spirit in such a variety of ways that the listing of them is no more possible than the listing of individuals themselves.

Music is analogous, but only analogous, to poetic and artistic symbolism. The symbol is irreducible to a particular interpretation, though it has many. It focuses not upon itself, but beyond itself, through itself, having an elevating quality. And it reveals, yet hides that which it reveals at the same time (9).

On the basis of this elusive (but I hope not too infuriating) interpretation, the musical performer can be likened to the preacher and for my purpose, the credibility of preachers is quite irrelevant to the point being made, neither am I assimilating musical meanings to those of religion.

The preacher has had a vision of the divine, has communed with God in his devotions, been accepted as it were, into the divine presence and received secret counsel. He then returns to the world and confident of the truth and goodness of his message, offers it to any who have ears to hear. His unpopularity or popularity, modesty or narcissism, do not deter him from carrying the task through because one thing alone overrides everything else: he has the truth. By comparison the musician can only perform with assurance if he has ascended his own version of the holy mountain. His focus of attention is to be the work itself above all other things, for only as he is enriched thereby can he perform authentically. The musical expression becomes itself an expression of his own fulfilment as a human being. The achievement of this condition is made more difficult by the 'impurities' of civilised life: people compete, things cost money, one has to be busy about many things one may not choose to do, one seeks approval. But these things can be endured, ignored where appropriate, because the supreme focus of attention is the music itself.

What I am saying is, briefly, that self-immersion in an activity is the greatest antidote to fear and anxiety concerning it. Thus we transcend ourselves and unite with the music itself. Just like the preacher transformed by his vision, we then reach the spirits of those who have ears to hear. We need not answer for the rest.

Do I realise that life is not that simple? Yes, of course, but the message still survives: the chief point of doing music is to do music. All the problems of anxiety and fear and many of those of tension, arise when our focus is upon other things, or when we lose our understanding of what we are about. These things I say, not in contradiction to my earlier point about not building one's life on the specialism, but to complement it. If the preacher only ever engaged in his devotions and his preaching, he would have no living message for humanity. His engagement in the business of living is a vital qualification for

preaching a meaningful gospel. I think this is also applicable to the musician, not because music has a message, but because music is for human beings and from human beings.

Faculty of Education, Kingston Polytechnic.

© Michael Newby 1983.

References and Notes:

- (1) Ben-Or. N. (1978), *The Alexander Technique and performance*, in *Tensions in the performance of music*, Grindea C (ed), New York, Alexander Broude Inc.
- (2) *ibid*, page 92.
- (3) *op. cit.*, Her paper on Tension in piano playing, page 97.
- (4) *ibid*, page 103.
- (5) I do not think stimulants are a matter for consideration here. They are taken to cope with problems other than tension.
- (6) See for example Pitcher G, Emotion; Peters R, Reason and Passion, in *Education and the Development of Reason*, Dearden R, (1975) London, Routledge, Kegan Paul.
- (7) See for example Storr A. (1975), *Creativity in music*, in *Psychology of Music*, Vol. 3 No. 2.
Lee V. (1933) Varieties of musical experience, pages 23-34, in *Music and its lovers*, New York, Dutton and Co.
- (8) He might appear to be a hermit (etc.) but remember the Wittgenstein example.
- (9) For these ideas I am indebted to Paul Tillich's paper in Hook S. (ed) (1962) *Religious experience and truth*, New York University Press.

THE RELATIONSHIP BETWEEN TENSION AND THE QUALITY OF MUSICAL PERFORMANCE

Andrew Steptoe

Abstract

The relationship between emotional tension and the quality of musical performance was studied in two groups of classical and operatic singers: a series of twenty young professionals and eighteen full-time students of voice. In both groups, tension was related to performance in an inverted-U pattern. The quality of performance was highest at a moderate level of tension, and deteriorated when tension was above or below this level. Optimal tension was lower for students than for professional singers. The professional singers reported that the quality of their performance was best when appearing in public, while peak performances were produced during lessons by students. Some cognitive aspects of performance anxiety were also examined. The implication of these patterns for the management of excessive tension in performance is considered.

Introduction

Musicians, actors and other performers have always been aware of the problems of excessive tension and stage-fright. Systematic investigations by scientists have however been rare. This position is now being remedied as psychologists, physicians and other researchers focus their attention on the experiences of the stage performer. Steptoe (1982) recently reviewed current research in this area, so it will not be described in detail here. Studies have been carried out into two aspects of performance anxiety. Firstly, treatment techniques developed for the management of minor psychiatric disorders are being adapted for application to performance anxiety. The methods that are being studied range from drugs and biofeedback to cognitive and behavioural psychotherapy programmes (James et al, 1977; Kendrick et al, 1982). Secondly, research is being carried out into the factors that promote performance anxiety, including cognitive, behavioural and physiological aspects. The study described in this paper is a contribution to the analysis of tension in performance.

Lehrer (1982) has pointed out that performance anxiety has three distinct components: physiological or emotional arousal (palpitations, perspiration etc), maladaptive cognitions (worrying about the quality of performance etc) and disturbances of behaviour (such as avoiding the practice of difficult passages). When the relationship of performance to physiological arousal is considered, singing or playing an instrument may be similar to other forms of skilled behaviour such as driving a car or playing tennis. It might be thought that performance would deteriorate linearly as arousal increases: the more tense you are, the less well you execute skilled activities. However this notion is not confirmed by scientific research. Instead, the relationship between tension and performance generally

follows a curvilinear or inverted-U shaped pattern. Performance improves with increasing arousal up to an intermediate stage, but deteriorates as emotional arousal rises beyond the optimum. At high levels, the nervous system is so sensitive that it responds to too many things at once, behaviour becomes disorganised and complex skills fragment. This pattern, called the Yerkes-Dodson Law, was formulated in detail by Duffy (1962). Since then there have been numerous demonstrations of the function using laboratory information-processing and behavioural tasks. The pattern appears to be robust, although the explanations for the effect remain controversial (Näätänen, 1973).

The inverted-U pattern is assumed to apply to stage performance, and indeed several treatment interventions are founded upon it. However, it has not been demonstrated directly amongst musicians or actors. The present study was designed to fill this gap in our knowledge, by examining the relation between emotional tension and performance quality in an homogenous group of musicians.

Investigation of this issue unfortunately presents major methodological difficulties. Ideally, one would wish to monitor performance in a wide range of settings, carrying out simultaneous physiological measurements. Leglar (1979) for example, was able to record a number of physiological parameters from organists under several different performance conditions (playing alone, in the presence of a critic, etc), and provided some evidence for the inverted-U pattern. However, both reliable measurement of performance quality and physiological monitoring during stage appearances are problematic. The present study relied on a different methodology, using estimates of performance quality from the subjects themselves, and relating these to ratings of emotional tension. Care was taken to ensure that these data were collected independently in different stages of the interview, so that the dangers of cross-referencing were reduced.

The main hypothesis tested was that performance quality would be rated highest in circumstances in which emotional tension was intermediate. Performance would deteriorate when tension was either too high or too low. A second aim was to investigate factors influencing this pattern. One element that may be important is the level of experience the performer has of appearing in public. It can be predicted that less experienced singers will find the entire task more difficult; they will be less confident of their abilities, have had fewer encouraging successes in the past, and will be less familiar with performance settings. Data from other psychological studies suggest that the optimal level of arousal is lower for a difficult than for an easy task. Thus, at a moderately high level of emotional arousal, a difficult task will be more disturbed than an easy one. If the same pattern applies to stage performance, it may be predicted that the highest performance quality will be achieved by the inexperienced at a lower level of arousal than for the more experienced. The notion was tested by comparing young professional singers with a group of less experienced singing students.

Some other factors that might influence tension in performance were also examined in this study. Performance anxiety may only emerge when excessive emotional arousal is complemented by an anxious cognitive style.

Musical and stage appearances are demanding, and it is essential that the thoughts of the actor or musician are concentrated on the expression of the words or music, their meaning and emotional content, transmission of these qualities to the audience and judgement of their effect, and in some cases remembering the part (when no score is present). This task can be disturbed by many types of intrusive thought. Some of these concern the conditions of performance—an unexpected noise in the auditorium, an abrasive relationship with another performer and so on. There may also be worries about the quality of the performance. Some musicians are doubtful about their ability to master technically taxing parts of their work, while others dread memory lapses. In stage-fright, there is a tendency to exaggerate minor mishaps in the imagination, blowing them up out of all proportion. Since these elements also contribute to the experience of anxiety, several of them were therefore also examined in the study.

Method

Subjects

Two groups of subjects participated in this study. The first group consisted of 20 young professional singers of classical music. There were 13 women and 7 men in the group, and the length of their professional careers ranged from 1 to 10 years (median 5). Their degree of success varied considerably. Some had principal contracts with leading opera companies in the UK, while others were occasionally obliged to supplement their income with teaching or non-musical work. However, all were pursuing careers as soloists.

The second group comprised 18 students at the Guildhall School of Music and Drama. There were 13 women and 5 men, and all were in their second or third year as full-time students of voice. All intended to pursue professional careers, predominantly in opera or classical singing, after leaving the Music School. No member of either group expressed severe problems of performance anxiety, although almost all acknowledged some stage-fright.

Procedure

Each participant completed a semistructured interview lasting 30 to 60 minutes. They were questioned about their careers, aspirations and experience of performing. The timing and nature of symptoms and sensations before a performance, and the routines surrounding performance were also discussed. Cognitive aspects of performance anxiety were explored through questions about strategies used to control nerves, responses to mishaps during performance, and ratings of worry about different elements of the performance. Some questions were omitted from the interviews with students, as being inappropriate for people with little public performing experience.

Emotional tension was assessed by presenting subjects with a 9-point scale ranging from extreme tension (1) to extreme relaxation (9). Professional

singers were asked to rate their feelings in the following situations, assuming that they were performing the same piece on each occasion.

- (a)—During a lesson with your teacher (1).
- (b)—During the dress rehearsal of an opera or concert (dr).
- (c)—During an audition for an important job (aud).
- (d)—When practising alone or with an accompanist (pr).
- (e)—During a major public performance (perf).

Students were asked to complete these ratings for singing in the following settings.

- (a)—During a lesson with your teacher (1).
- (b)—During the dress rehearsal of a college performance (r).
- (c)—When practising alone or with an accompanist (pr).
- (d)—During a master class, when you are singing to the group (mc).

Performance quality was assessed at a much later stage of the interview by presenting subjects with a series of cards, on each of which was typed the name of one of the settings described above. Subjects were asked to rank the cards according to the quality of their performance in each case. Subjects were then questioned about specific facets of performance that might be affected by the occasion, including breath control, intonation and excitement or involvement.

General anxiety, and anxiety in performance settings were assessed using the State-Trait Anxiety Inventory (STAI; Spielberger et al, 1970). This instrument consists of two questionnaires, each containing 20 items to be endorsed on a 4 point scale. One inventory measures Trait or dispositional anxiety, while the other refers to anxiety in the performance setting (State). The maximum possible score on each inventory is 80, while the minimum is 20.

All statistical analyses were performed on a Hewlett-Packard HP-85 microcomputer. Student t-tests (two-tailed) and product moment correlations were employed in the analyses.

Results

The average Trait anxiety, and State anxiety when performing are shown in Table 1. The mean levels of Trait anxiety are close to the population norms for subjects of this age, education and sex distribution, indicating that the sample was representative in this respect. State scores are significantly higher than Trait anxiety scores in both groups, suggesting that subjects respond to musical performance with an increase in anxiety. Trait and State scores correlated across individuals in the professional and student samples ($r = .516$ and $.733$ respectively, $p < .025$). This indicates that people with high disposition to anxiety also had relatively high performance anxiety, and suggests that Trait anxiety may be a strong predictor of disturbance during performance. It was decided therefore to contrast people with high and low Trait anxiety in the analyses of cognitive aspects of performance anxiety.

Tension and performance quality

Professional singers ranked performance in 5 settings, while students were questioned about 4 performance settings. In order to make these rankings comparable, they were converted to a common numerical base, then averaged within groups for each performance setting. Mean tension scores (from the 9-point rating scale) were also calculated for each setting.

Figure 1 illustrates the relationship between tension and performance quality for professional singers. Lower scores on the performance scale indicate better quality. The sample considered that their best performances were made on public appearances. The rating for public performances was significantly different from that in all other settings ($t > 2.14$, $df\ 18$, $p < .05$). Singing was considered least good during auditions, with dress rehearsals, practice and lessons being intermediate. As predicted, the best performance occurred at a moderate level of tension, when emotional arousal is too high or too low, singing is less satisfactory. The tension levels endorsed during public performance were significantly different from those present during lessons, practice or auditions ($t > 2.68$, $p < .02$). However, tension in public performance did not differ from that present during dress rehearsals ($t = .68$, ns). It is evident from the curve in Figure 1 that the decline in performance quality is precipitous as tension increases beyond moderate levels. The smallest disturbance may push the individual onto the downward limb of the curve, where tension and deteriorating quality reinforce each other.

The pattern among students is shown in Figure 2. Once again, an inverted-U is observed, with best performance at a moderate level of tension. In the case of students, the best performances are seen during lessons, with master classes generating the most tension and the worst showing. The tension levels reported during lessons are significantly different from those in all other settings ($t > 2.52$, $df\ 17$, $p < .025$).

The mean tension level for students in their best performance setting (lesson) was $6.14 (\pm 1.95)$. The corresponding value for professional singers (reported during public performance) was $3.79 (\pm 1.36)$. These scores were significantly different ($t = 4.37$, $df\ 36$, $p < .001$), confirming that the optimal level of tension was higher for the more experienced young professional singers compared with students.

Participants were questioned about the specific components of their performance which might be influenced by circumstances. Breath control was considered the most vulnerable element, followed by disturbances in posture and stance, and poor intonation. Almost all subjects reported that their level of excitement and involvement in the music was highest when appearing before an audience.

The timing and symptoms of performance anxiety

All but two of the participants in the study admitted being nervous before a performance. Thirty of them were able to specify when their anxiety reached its peak. These results are presented in Table 1. It appears from the distribution that subjects fell into two groups. The majority reported that their anxiety peaked shortly before the performance, in the hours immediately preceding the event. The highest levels of tension in the remainder were experienced one or more days before the performance itself. In one case, a

professional singer said that she became most nervous a week before the performance, and her worries subsided after that. The symptoms and sensations reported by the sample are similar to those experienced by patients with clinical anxiety. A dry mouth, breathlessness, pounding heart and tense neck, shoulders and legs were repeatedly described. Less commonly, subjects reported feeling sick, a loss of appetite and difficulty in sleeping. Evidently these are not unusual feelings, since they are experienced by a large proportion of subjects who have no special problems with performance anxiety, and are pursuing their careers successfully.

Cognitive aspects of performance anxiety

It has been suggested that one important cognitive component of extreme tension in performance is a discrepancy between worry and action (Lehrer, 1981). People may worry and ruminate about specific aspects of their performance (a memory slip, a mistake in a difficult passage) without taking steps to prepare themselves for these eventualities. This notion received some support in the present study. For example, participants were asked to rate on a 5 point scale (ranging from 1 = very much to 5 = not at all) the extent to which they thought about the possibility that their breath control would fail during a performance. People with higher Trait anxiety (on median split) reported significantly more preoccupation with failures in breath control than the less anxious (means 3.33 ± 1.4 and $4.59 \pm .6$ respectively, $t = 3.46$, $df\ 30$, $p < .01$). However, both the high and low Trait subjects failed to plan in advance how they would recover if their breath failed during performance (mean = $4.67 \pm .5$). A similar pattern was found when subjects were questioned on the amount they thought about memory slips, and planned how they would recover from memory slips should they occur.

Other aspects of cognitive activity were analysed again by contrasting subjects high and low in Trait anxiety. Subjects were asked about the ways in which they coped with nerves, and in particular about mental strategies employed during the performance. Sixty-six per cent of the high Trait subjects, compared with 41 per cent of low Trait individuals, admitted saying things to themselves that minimised the significance of the occasion (such as 'It's just another concert; in a year from now no-one will remember this one anyway'). Another strategy that was used less frequently was to imagine that the audience was not there, and that the performer was singing for himself or herself alone. Again, more high Trait subjects (27 per cent) used this strategy compared with low Trait people (12 per cent).

Discussion

The limitations of the present study must be borne in mind when considering the pattern of results. The investigation was carried out on a relatively small group of subjects, none of whom reported serious problems of performance anxiety. No behavioural data or physiological recordings were available, so the results are confined to self-reported interview, questionnaire and rating data. Nevertheless, the relationship between emotional tension and performance quality followed the anticipated inverted-U pattern. Performance was said to be best in the setting that elicited moderate tension, with impaired performance both above and below this level. Despite some variation

between subjects, on average the professionals rated public performances as the occasions on which they appeared at their best. On the other hand, they reported that they sang least well in auditions, and that they experienced the most tension in this setting. Performance quality was intermediate during lessons and practice, when tension was relatively low.

This pattern resolves the confusion surrounding statements often made by musicians that they 'need' tension and nervousness in order to perform well. This belief may be due to mislabelling of general physiological arousal for anxiety. Similar physiological responses underline different states of intense emotion. Modifications in pulse rate, breathing, muscle tension and perspiration are not specific to anxiety, but occur with excitement and other positive emotions. The arousal needed for a good performance is not anxiety, but a state of moderate physical excitement. However, it is clear from this survey that symptoms of anxiety and distress before a performance are common. They are experienced both by accomplished professionals and students of singing. In some cases the symptoms may be severe. One professional singer for example regularly had diarrhoea before a performance; he welcomed this as an indication that he was sufficiently 'toned up' for the occasion.

The contrast between professional and student singers illustrates the effects of performing experience. Like the professionals, students showed an inverted-U curve, although the master class replaced the audition as the most feared, least favoured environment for singing. But their best performance was produced at a significantly lower level of emotional tension than in professionals. The difference is reminiscent of the pattern for easy and difficult motor skills observed in psychological research. When tasks are difficult, they are performed more accurately and efficiently at low levels of arousal compared with easy tasks. More experienced professional singers with their greater technical facility may find the task itself less demanding.

This pattern implies that as musicians become more experienced and proficient, their peak performance will emerge at higher rather than lower levels of emotional arousal. If they are too relaxed, the occasion may suffer. Paradoxically, the most experienced may require more rather than less emotional tension for a good performance. At least one professional singer in this sample admitted difficulty in putting herself into a sufficiently inspired frame of mind for a performance. Having few technical problems, she tended to adopt a casual attitude to each concert, with the result that she sometimes gave a dull performance. Another singer strove to maintain her concentration by hitting herself, driving herself to focus completely on the music.

For the majority of people with severe performance anxiety, the problem is of course associated with excessive tension. Treatments designed to reduce tension by moderating physiological arousal have therefore been explored. Psychological methods such as biofeedback and relaxation have been used, together with beta-blocking drugs that attenuate the physiological parameters of arousal. The latter have been applied with considerable success, particularly to instrumental musicians whose dexterity is adversely affected by stage-fright (James et al, 1977). Recent investigations suggest however that pharmacological treatment may not always be sufficient. The emotional aspects of the problem may be unaffected, or even exacerbated by the strange

experience of performing without peripheral physiological arousal (Brantigan et al, 1979). This was seen in a recent double-blind trial of beta-blockade for string players (Neftel et al, 1982). Although some aspects of performance were improved, notably the regularity of fast passages, stage-fright assessed before the performance was not altered.

The reason for this is that performance anxiety is not simply a result of excessive tension, since it also involves a particular cognitive or mental attitude. Some aspects of this cognitive style were studied in the present survey. The more anxious performers expressed greater worry about possible mishaps such as poor breath control or memory lapses. They tried to counter these concerns by minimising the importance of performing, instead of confronting their worries actively and adopting appropriate remedies. Many had developed highly rigid preparatory routines before appearing in public, with strict control over exercise, speech and diet. Unfortunately, this inflexibility made them more vulnerable to unexpected disruptions or enforced changes in schedule. Their routines interrupted, the anxious singers found concentration on the task even more difficult.

All these worries, ruminations on ability and irritations about the practical arrangements surrounding a public performance have an impact on performance quality. The singer may find it difficult to focus on his or her work, and this in turn heightens emotional arousal, and a vicious circle is set up. Strategies are currently being developed to modify these cognitive aspects of tension in performance (see Steptoe, 1982). Kendrick et al (1982) for example devised a cognitive behavioural modification programme based on Meichenbaum's (1977) technique. This has previously been used for anxiety about examinations, public speaking and other settings. The method appears promising, since it has effects both on cognitive and behavioural aspects of the problem.

The inverted-U curve observed in the study further endorses the parallel between the anxieties of musicians and actors and the behaviour disorders regularly treated by clinical psychologists. It must encourage further applications of behavioural psychotherapeutic techniques to the tensions experienced by stage performers.

Department of Psychology, Jenner Wing,
St. George's Hospital Medical School,
Tooting, London, SW17 0RE.
© Andrew Steptoe 1983.

Acknowledgement

The author is grateful to Dr. Paul Lehrer for valuable discussions, and to the participants in this study for their co-operation. Special thanks are also due to Noelle Barker and Diana Howard of the Guildhall School of Music and Drama, London, for their co-operation in recruiting the sample of students.

TABLE 1

Anxiety in Professional and Student Singers

	Mean (\pm s.d.)		t (two-tailed)
	Trait	State	
Professionals (n=20)	40.6 \pm 8.76	44.2 \pm 7.41	1.97 (p < .06)
Students (n=18)	38.7 \pm 9.2	45.4 \pm 11.0	3.73 (p < .01)

Timing of Nervousness before Performance

	<1hr	1-2hr	2-6hr	6-24hr	24-48hr	> 48hr
Peak nervousness	14	6	2	1	4	3

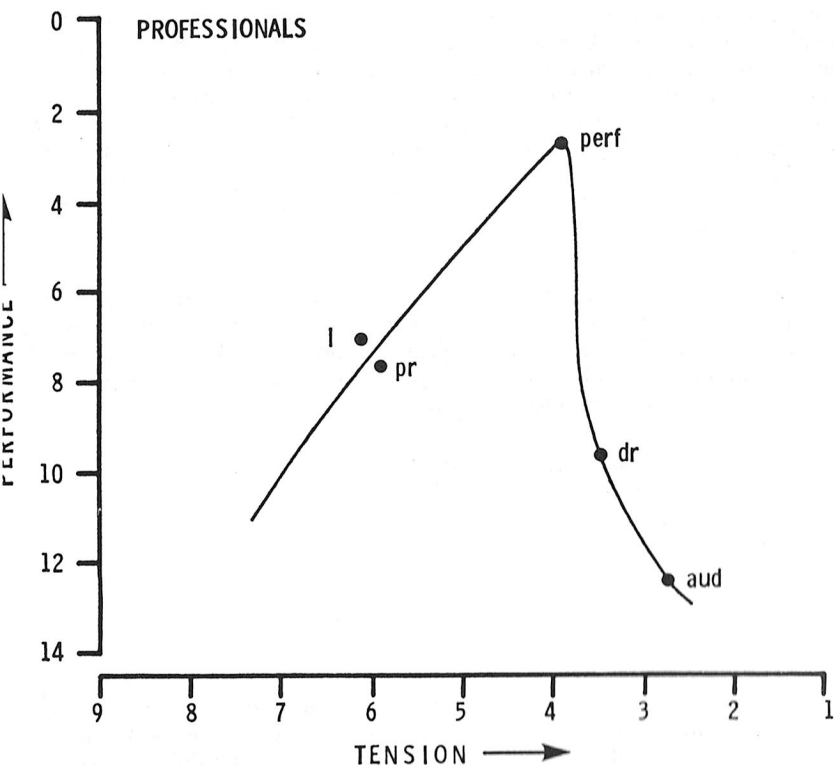


Figure 1. The relationship between emotional tension and performance in professional singers. See text page 15 for abbreviations.

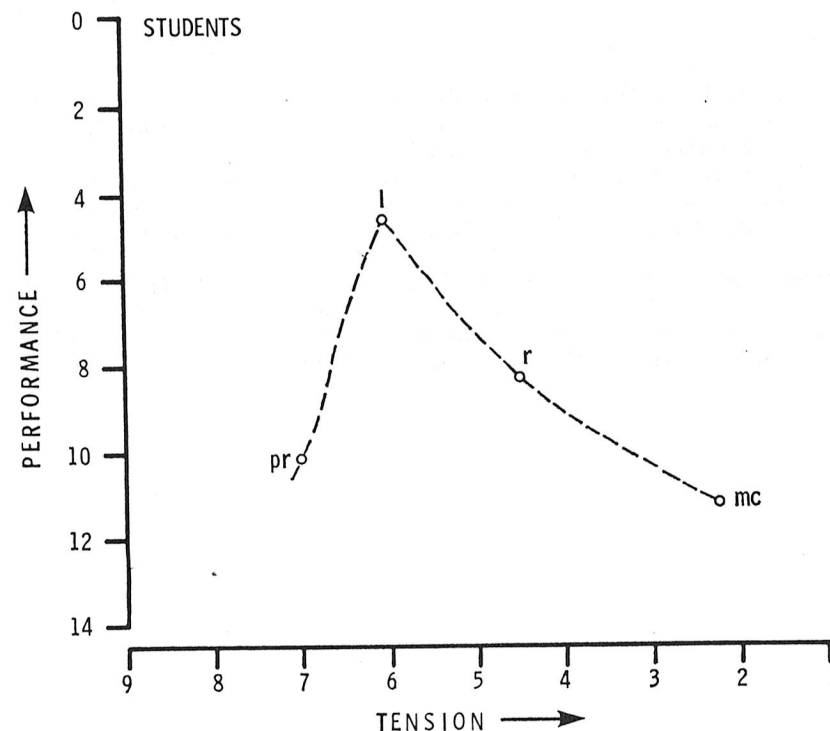


Figure 2. The relationship between emotional tension and performance quality in students of singing. See text page 15 for abbreviations.

References

- Brantigan, C. O., Brantigan, T. A. and Joseph, N. (1979) The effect of beta-blockade on stage-fright. *Rocky Mountain Medical Journal*, 76, 227-232.
- Duffy, E. (1962) *Activation and Behaviour*. New York, Wiley.
- James, I. M., Pearson, R. M., Griffith, A. N. W. and Newburg, P. (1977). The effect of oxprenolol on stage-fright in musicians. *Lancet*, ii, 952-954.
- Kendrick, M. J., Craig, K. D., Lawson, D. W., and Davidson, P. O. (1982). Cognitive and behavioral therapy for musical-performance anxiety. *Journal of Consulting and Clinical Psychology*, 50, 353-362.
- Leglar, M. (1979). Measurement of indicators of anxiety levels under various conditions of musical performance. *Dissertation Abstracts International* 34, 5201A.
- Lehrer, P. M. (1981). Studies in performance anxiety. Paper to the International Conference on Tension in Performance, Kingston Polytechnic.

Lehrer, P. M. (1982). A psychologist's perspective. In: *Tensions in the Performance of Music*. (Ed) C. Grindea. London, Kahn and Averill. pp 134-152.

Eichenbaum, D. (1977). *Cognitive Behavior Modification*. New York, Plenum Press.

Jääskeläinen, R. (1973). The inverted-U relationship between activation and performance: a critical review. In: *Attention and Performance, IV*. (Ed) S. Kornblum. London, Academic Press. pp 155-174.

Leffert, K. A., Adler, R. H., Kappell, L., Rossi, M., Dolder, M., Kaser, H. E., Bruggesser, H. H., and Vorkauf, H. (1982). Stage-fright in musicians: a model illustrating the effect of beta blockers. *Psychosomatic Medicine*, 44, 461-469.

Mielberger, C. D., Gorsuch, R. L. and Lushene, R. E. (1970). *STAI Manual*. Palo Alto, Consulting Psychologists' Press.

Leptoe, A. (1982). Performance anxiety: recent developments in its analysis and management. *Musical Times*, 123, 537-541.

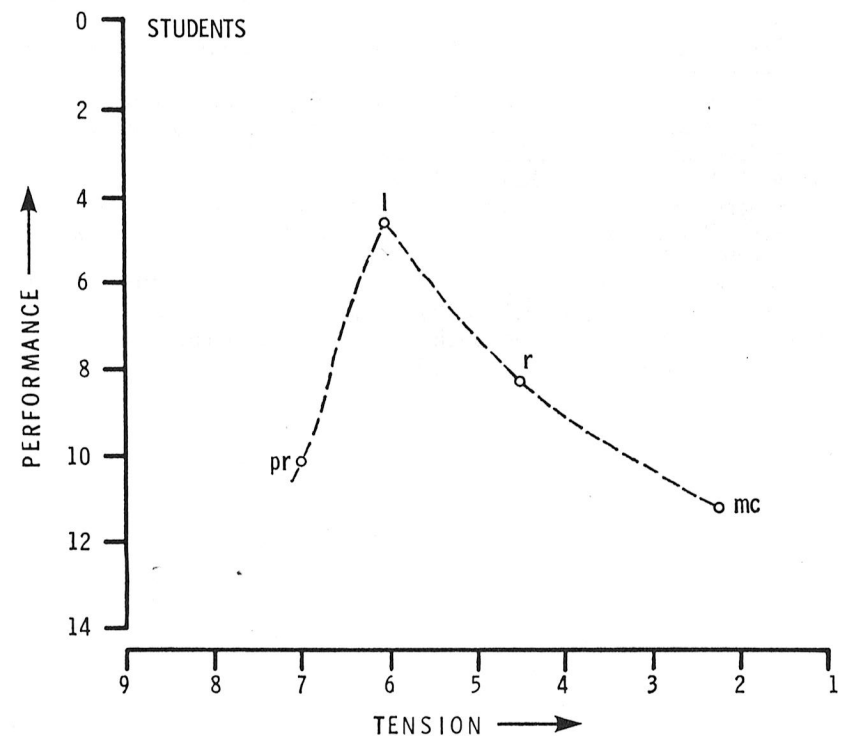


Figure 2. The relationship between emotional tension and performance quality in students of singing. See text page 15 for abbreviations.

References

- Brantigan, C. O., Brantigan, T. A. and Joseph, N. (1979) The effect of beta-blockade on stage-fright. *Rocky Mountain Medical Journal*, 76, 227-232.
- Duffy, E. (1962) *Activation and Behaviour*. New York, Wiley.
- James, I. M., Pearson, R. M., Griffith, A. N. W. and Newburg, P. (1977). The effect of oxprenolol on stage-fright in musicians. *Lancet*, ii, 952-954.
- Kendrick, M. J., Craig, K. D., Lawson, D. W., and Davidson, P. O. (1982). Cognitive and behavioral therapy for musical-performance anxiety. *Journal of Consulting and Clinical Psychology*, 50, 353-362.
- Leglar, M. (1979). Measurement of indicators of anxiety levels under various conditions of musical performance. *Dissertation Abstracts International* 34, 5201A.
- Lehrer, P. M. (1981). Studies in performance anxiety. Paper to the International Conference on Tension in Performance, Kingston Polytechnic.

- Lehrer, P. M. (1982). A psychologist's perspective. In: *Tensions in the Performance of Music*. (Ed) C. Grindea. London, Kahn and Averill. pp 134-152.
- Meichenbaum, D. (1977). *Cognitive Behavior Modification*. New York, Plenum Press.
- Näätänen, R. (1973). The inverted-U relationship between activation and performance: a critical review. In: *Attention and Performance, IV*. (Ed) S. Kornblum. London, Academic Press. pp 155-174.
- Neftel, K. A., Adler, R. H., Kappell, L., Rossi, M., Dolder, M., Kaser, H. E., Bruggesser, H. H., and Vorkauf, H. (1982). Stage-fright in musicians: a model illustrating the effect of beta blockers. *Psychosomatic Medicine*, 44, 461-469.
- Spielberger, C. D., Gorsuch, R. L. and Lushene, R. E. (1970). *STAI Manual*. Palo Alto, Consulting Psychologists' Press.
- Step toe, A. (1982). Performance anxiety: recent developments in its analysis and management. *Musical Times*, 123, 537-541.

PHYSICIANS' VIEWS OF PHYSICAL PROBLEMS

Fred H. Hochberg, Robert D. Leffert and Robert J. Silverman

The article which follows first appeared in the Winter 1982 edition of *The Piano Quarterly*. It is reprinted now by kind permission of the publisher, Robert J. Silverman. The introduction, not part of the original text, is based on material supplied by Prof. Carola Grindea.

In America, during the last two years or so and through the media of newspapers, journals, television and radio there has been much publicity of two 'cases célèbres', those of Leon Fleisher and Gary Graffman, both outstanding American pianists, who suffered crippling hand injuries through over-exertion. The former underwent delicate and dangerous surgery and the latter submitted to bio-feedback therapy.

The publicity associated with these two cases has had wide repercussions amongst pianists, teachers and members of the medical profession. The piano playing profession is greatly indebted to these two artists for permitting news of their debilitating conditions to be made public. As a result, no less than 150 musicians, most of them pianists, are receiving treatment at the Massachusetts General Hospital, for chronic or acute tendinitis or the more serious and very damaging carpal-tunnel syndrome. The now famous medical team supervising this pioneer work consists of Dr. Fred Hochberg, a neurologist, Dr. Robert Leffert, an orthopaedic surgeon and Dr. Bhagwan Shahani, a neurophysiologist.

As a consequence of their research into complex problems connected with hand injuries and 'upper extremities' as they call the playing apparatus, there is now refined understanding of how to treat these crippling conditions. This has meant as well that previous diagnoses and treatments once thought appropriate, have been reviewed.

A further outcome of the research is that there is a new awareness of the physiological correlates of performance. Such knowledge should guide a reappraisal of keyboard pedagogy and performance, to diminish the possibility of physical injury and related psychological trauma. Musicians should follow the example set by athletes and dancers who demonstrate a greater sense of body-awareness. It is an established practice that physiotherapists are available to attend to the physical needs of athletes and dancers, during training. Should not this custom be extended to instrumentalists? Why is it that musicians seek assistance only when an injury is in an advanced stage and in some cases, when it is too late?

It is to be hoped that the proceedings at the Second International ISSTIP Conference (1983) and the 'Medical Problems of Musicians' Conference, as part of the Aspen Music Festival (1983), will stimulate more research into this so far under-explored area.

"To quote from a recent release from Massachusetts General Hospital: Concert pianists are usually not considered super athletes, but in a sense that is exactly what they are.

Music lessons begin early, but pianists generally do not gain national recognition until their early twenties, and once they have established a reputation, their careers often span another fifty years.

Throughout this time, virtuosos and aspiring virtuosos practice six to eight hours a day, seven days a week. A popular artist may perform a hundred concerts a year and also make recordings.

By comparison, the life-span of professional athletes is brief. They reach the peak of their ability by their early twenties and are in the limelight, typically, for four or five years. Only the super athlete remains at the top of his prowess for ten years or longer. What's more, the playing season is shorter than that of a concert soloist.

Given the tremendous physical demands on professional pianists, it is no wonder that many develop problems with their hands—problems that eventually may cripple their concert careers. Pianists take it as a matter of course. They adapt until it becomes impossible.

Until recently, understanding of the musician's hand and of its difficulties was limited to works culminating in the monograph of Otto Ortmann, "The Physiological Mechanics of Piano Technique", published almost fifty years ago.

For the past two years a team of physicians at Massachusetts General Hospital—headed by Drs. Fred H. Hochberg and Robert D. Leffert—has labored to understand these difficulties and to provide treatment for them. These physicians are often found next to the piano in the Massachusetts General Hospital chapel.

To date more than 150 musicians have been seen.

Robert J. Silverman: Underlying the physiological problems that you have been seeing, have you come to any conclusions about the causes for the problems? To put it another way, are some of the problems originally caused by psychological stress; are they inherited characteristics; are people with musical talent asking their hands to perform tasks that they may not be adapted to doing; is too much practising a possible cause; is playing the wrong kind of music harmful, in the sense that certain kinds of music require large stretches or a great deal of octave work or the like?

The answers to the questions above and to others in this interview were provided by Doctors Robert D. Leffert and Fred H. Hochberg. Dr. Leffert was called away in the midst of the interview so that the bulk of the answers are those of Dr. Hochberg.

Dr. Robert D. Leffert: It's a little like the problem that the prophet Hillel had attempting to explain his religion while standing on one foot. With that in mind I would suggest that we are dealing with all kinds of people who are heir to all kinds of disabilities that may have nothing whatsoever to do with playing the piano. We must first of all look at the individual from a general point of view in order to determine that some not obvious problem is causing the pianist's difficulty.

We look at the individual who is subjecting parts of his body to a great deal of use or overuse and then look at the physiology and the anatomy of that person to try to determine if, from a purely mechanical viewpoint, the person's body is capable of standing up under the hard use.

Personally, I do not believe that most problems can be attributed to either small or large hands. It is a matter of making do with what you have got. While we are seeing pianists on all levels, we have found that many aspiring artists, as well as already established artists, subject themselves to really punishing routines. Some of these routines seem not to be grounded in logic but are performed because someone suggested them or because they believed it was beneficial. What I am suggesting is that there has been a great deal written about pianistic technique but little to correlate it to the anatomy of people.

Dr. Fred H. Hochberg: Probably nine out of ten of the pianists who come to us do so because their problem is interfering with their musical abilities. Most of the people will come with a complaint about pain or inability to perform certain technical requirements. If you ask them if the problem interferes with any other aspect of their life, the answer is almost always, no. ①

Almost all the time we are dealing with pain; inflammatory tendinitis; inflammations of coverings of joints; brought on by overuse or by some unusual technical problem having to do with the instrument.

The second most common cause of difficulty is that of a neurologic sphere. Rarely have we come across unique, widespread neurologic illness that will ultimately interfere with a whole variety of functions. Most often we are dealing with localized neurologic dysfunction or with matters connected with control of the hand movement. ②

The category that we expected to see when we first started out that we rarely see is the group of pianists who are excessively fragile, have emotional difficulties, and are exhibiting problems as a symptom of depression or hysteria. The people that we see are, in general, healthy people making difficult emotional responses to earth-shattering problems. When their hands go, their career disappears. In almost all instances their adaptation to their problem is as unique and solid as anyone could make. So we tend not to see people who fall apart for emotional reasons. In fact, of the two or three people who have come to us with emotional problems and who say to us, "I am under treatment for manic depressive disease, or for alcoholism", we have found that that is a completely unrelated problem. They have pure and simple hand pathology that has to be dealt with as a separate problem. They breathe a sigh of relief when they realize they don't have to have the terrible meshing of their psychiatric diagnosis and hand problems.

Dr. Leffert: I think what Dr. Hochberg is saying is terribly important. In almost all cases we do not have to say to the patient, "Well, it's obvious that the stress has gotten to you and that in reality you don't want to play the piano anymore and that your hand problem is really a cop out". We have found that in cases where the pianist has severe right hand problems, they have continued to perform with the left hand. It is quite obvious that if they did not want to perform, they would not be out there playing concertos for the left hand.

RJS: Isn't it the case that at the time Leon Fleisher began to experience his right hand problems, he was under a great deal of personal stress?

Dr. Hochberg: Let us recall some of Leon Fleisher's original complaints. In 1963 or 1964 Leon complained of difficulty in his right forearm. I think you would agree that that would be an exceedingly rare complaint for a pianist to make. If stress were the problem, you might expect to hear about difficulties with broken octaves; can't play certain pieces anymore; am unable to play with my usual speed. But to say that there was trouble with strength in the forearm has been a fairly exotic complaint to us.

RJS: Have you thought about left and right handedness as it may affect the pianist?

Dr. Hochberg: There is no evidence at all that the right hand has any structural or physiological characteristic in any way different from the left. There might be some argument about this statement because some observers have noticed that the humerus is different on one side or the other. The two or three observations that we have made on this question (and about three quarters of the people who have come to us have had right hand problems) are the following: first it would seem that the majority of the notes that a pianist plays are about the ten notes above middle C. If statistically this is correct, then the pianist should probably sit slightly to the right of centre. The requirements for *forte* in the right hand are often in a position on the keyboard that is anatomically inefficient. One of the things that Dr. Leffert and I have noticed is the tendency of pianists to ulnar-deviate (turn towards the fifth finger) their hand as they go up the keyboard. It's a tendency that is anatomically less and less efficient the further they go. As you begin to ulnar-deviate, for example in playing octaves in the upper register of the keyboard, you have less and less strength in the extensors of the fourth and fifth fingers. Well, it does not seem hard to understand then, why one of the most common complaints is tendinitis related to the lateral portion of the arm. It's struck us as strange that no one has tried to think about the piano as an occupational instrument in the sense of whether it is designed to get maximum function. Josef Hofmann was correct when he went to Steinway and asked for a piano for small hands with narrower keys and less of a throw. He had one built. Maybe we are caught in a time warp when we use a standard piano to play the music of Rachmaninoff and Ravel if we have small hands. In addition, we are uncertain as to the relationship between piano structure and particular pieces of music. There is a fascinating piece of work by Jim Parrott and David Harrison, music librarians in Canada. They traced the relationship of hand difficulties to changes in the repertoire of mid-nineteenth century virtuosos. As composers were no longer obliged to play their own music and yielded to virtuosos, hand difficulties emerged. To use the pianist's term, the music often did not fit the hand.

RJS: I'm sure that this article must also have pointed out that the nature of the instrument was also changing. As it became more powerful, it was played in larger halls and this required greater strength on the part of the performer.

Dr. Hochberg: You're quite right. By the eighteen seventies we see the development of certain specialists whose sole interest was intervention, on behalf of pianists who might be expected to have hand difficulties, or had already developed them. There were operations performed to increase dexterity and to strengthen the fourth and fifth fingers as well as to allow them to stretch further laterally.

Let me tell you some of the things that we are doing. But first I must add that it's a new field and therefore there are no rules that are written in stone. To give you an example, when a person comes to us with a problem our first task is to attempt to rule out the common causes of hand difficulties. Fredrik Wanger, a fine pianist who is helping us on this project, will talk with the person to get a sense of what the problems are from a pianist's standpoint. The pianist completes an extended questionnaire. It delves into such detail as the history of the problem and any other difficulties that have occurred throughout the years. We even ask about the kind of repertoire most played. After that, an appointment is made for examinations with Dr. Leffert who is an orthopedic surgeon and with me, a neurologist. We also have available a rheumatologist, a bone and joint specialist and an electrophysiologist—a diagnostician using electrical techniques.

The pianist will often provide us with the clues to the information that we are seeking because the problems can be complex. Usually, as mentioned earlier, when the pianist is asked if the problem is related to any other aspect of his life, the answer is no. The answer indicates that the problem is occupationally related. Often the person who comes to us has travelled a long distance. So we try to help him find the nature of his problem quickly so that he can go back home and seek out the specialists who may help him.

In other words, somebody who comes from California may say that he has previously seen fifteen different doctors; has had injections of corticosteroids; medications; electro-diagnostic studies; then he will say that the truth of the matter is that he has come to us because he hopes that for once in his life he will know what is wrong with his hand.

From our standpoint there are two separate issues: (1) What brought on his condition and (2) How can he get out of it? Usually we can settle the first issue, but the second is a lot harder. Histories may date back as long as thirty or thirty-five years and it is not easy to undo problems that have been going on for that length of time. There are no "key-in-the-lock" solutions. Besides the tests that I have previously described, and others, we will watch the pianist play, and here again Professor Wanger has been a great help. We are vitally interested to determine what, if any, accommodations the pianist has made to try to lessen his problem. The accommodations themselves may be half the problem. It's one thing to have developed a weakness of the fourth and fifth fingers from tendinitis or from some muscle problem; it's another to have them compensated by playing octaves with first and third fingers. When you do that any weakness that you started with is intensified. So the problem is two-fold: get rid of the weakness and get rid of the one-three octaves. It's happened with Gary Graffman and it's happened with eight other pianists we have seen.

There is another group of pianists who have weakness in their third finger which tends to cause it to fall into the keyboard. What they do to

compensate is to elevate their second finger when they are asking their third finger for activity. This throws their entire hand posture off.

RJS: You can hardly blame them.

Dr. Hochberg: Compensation may be fine but it is distracting to any doctor trying to help them find the root of their problem. The doctor will say, "What are you here for?" The patient will answer, "I am here because my right hand is not working well". "What do you mean?" the doctor will ask. "I don't know, but I can tell you a couple of things. The first is that my second finger is continually higher than my third".

Very often, as I said before, the compensation may be pointed out as part of the problem. So we use clinical observation and we also use video tape. If we can isolate the problem we set a series of very simple, straightforward goals. The goals may be to increase the mobility of the extensor tendon of one or two fingers. After that is done he may go on a program of biofeedback or control so that he can regain the posture of the second finger.

RJS: Would you explain biofeedback as it applies to this situation?

Dr. Hochberg: Seventy-five per cent of the people that we see have pain problems. Let's get rid of that group for the time being. The smaller group, for reasons that are not always clear, have taken up unusual hand positions—postures that make no sense as far as the instrument is concerned are encountered. For example, a pianist who flexes his fourth and fifth fingers into his palm obviously does not do that voluntarily. He begins to play one-three octaves. This is a voluntary compensation to the fourth and fifth finger weakness. But then if you say to the pianist a year later or five years later, "Why don't you just hold your hand in front of you without flexing the fourth and fifth fingers?" we find he is no longer able to do so. The mental set has become established. The fourth and fifth fingers into the palm are now normal. It's like having a twitch in your eye. It's habitual after a period of time. So the problem is how to bring somebody out of this habit? The best way is to reprogram them or remodel the experience of having their hand out in front of them without the fourth and fifth fingers curling. You can place a bell on top of their fourth or fifth finger. Every time the finger flexes the bell falls off. After a while they learn that the finger has moved to the wrong location. You can use a series of electrical devices which provide us with information about the muscle group that is flexing and extending the fourth and fifth fingers. The pianist can see on a screen how, as the fourth and fifth finger flexors are activated a lot of noise is produced. After a while they learn to control the noise by watching and by hearing. So they begin to control the fourth and fifth fingers. For most of us, simple acts like breathing or the placement of our feet as we walk, have become automatic. When you lose the ability to perform a simple act such as walking, one approach to re-training is biofeedback.

The group of people I have just been referring to present vexing problems to the doctor. Because they do not experience pain, they often let their problem linger before they go for help. By that time the problem has become ingrained.

Dr. Hochberg: You're quite right. By the eighteen seventies we see the development of certain specialists whose sole interest was intervention, on behalf of pianists who might be expected to have hand difficulties, or had already developed them. There were operations performed to increase dexterity and to strengthen the fourth and fifth fingers as well as to allow them to stretch further laterally.

Let me tell you some of the things that we are doing. But first I must add that it's a new field and therefore there are no rules that are written in stone. To give you an example, when a person comes to us with a problem our first task is to attempt to rule out the common causes of hand difficulties. Fredrik Wanger, a fine pianist who is helping us on this project, will talk with the person to get a sense of what the problems are from a pianist's standpoint. The pianist completes an extended questionnaire. It delves into such detail as the history of the problem and any other difficulties that have occurred throughout the years. We even ask about the kind of repertoire most played. After that, an appointment is made for examinations with Dr. Leffert who is an orthopedic surgeon and with me, a neurologist. We also have available a rheumatologist, a bone and joint specialist and an electrophysiologist—a diagnostician using electrical techniques.

The pianist will often provide us with the clues to the information that we are seeking because the problems can be complex. Usually, as mentioned earlier, when the pianist is asked if the problem is related to any other aspect of his life, the answer is no. The answer indicates that the problem is occupationally related. Often the person who comes to us has travelled a long distance. So we try to help him find the nature of his problem quickly so that he can go back home and seek out the specialists who may help him.

In other words, somebody who comes from California may say that he has previously seen fifteen different doctors; has had injections of corticosteroids; medications; electro-diagnostic studies; then he will say that the truth of the matter is that he has come to us because he hopes that for once in his life he will know what is wrong with his hand.

From our standpoint there are two separate issues: (1) What brought on his condition and (2) How can he get out of it? Usually we can settle the first issue, but the second is a lot harder. Histories may date back as long as thirty or thirty-five years and it is not easy to undo problems that have been going on for that length of time. There are no "key-in-the-lock" solutions. Besides the tests that I have previously described, and others, we will watch the pianist play, and here again Professor Wanger has been a great help. We are vitally interested to determine what, if any, accommodations the pianist has made to try to lessen his problem. The accommodations themselves may be half the problem. It's one thing to have developed a weakness of the fourth and fifth fingers from tendinitis or from some muscle problem; it's another to have them compensated by playing octaves with first and third fingers. When you do that any weakness that you started with is intensified. So the problem is two-fold: get rid of the weakness and get rid of the one-three octaves. It's happened with Gary Graffman and it's happened with eight other pianists we have seen.

There is another group of pianists who have weakness in their third finger which tends to cause it to fall into the keyboard. What they do to

compensate is to elevate their second finger when they are asking their third finger for activity. This throws their entire hand posture off.

RJS: You can hardly blame them.

Dr. Hochberg: Compensation may be fine but it is distracting to any doctor trying to help them find the root of their problem. The doctor will say, "What are you here for?" The patient will answer, "I am here because my right hand is not working well". "What do you mean?" the doctor will ask. "I don't know, but I can tell you a couple of things. The first is that my second finger is continually higher than my third".

Very often, as I said before, the compensation may be pointed out as part of the problem. So we use clinical observation and we also use video tape. If we can isolate the problem we set a series of very simple, straightforward goals. The goals may be to increase the mobility of the extensor tendon of one or two fingers. After that is done he may go on a program of biofeedback or control so that he can regain the posture of the second finger.

RJS: Would you explain biofeedback as it applies to this situation?

Dr. Hochberg: Seventy-five per cent of the people that we see have pain problems. Let's get rid of that group for the time being. The smaller group, for reasons that are not always clear, have taken up unusual hand positions—postures that make no sense as far as the instrument is concerned are encountered. For example, a pianist who flexes his fourth and fifth fingers into his palm obviously does not do that voluntarily. He begins to play one-three octaves. This is a voluntary compensation to the fourth and fifth finger weakness. But then if you say to the pianist a year later or five years later, "Why don't you just hold your hand in front of you without flexing the fourth and fifth fingers?" we find he is no longer able to do so. The mental set has become established. The fourth and fifth fingers into the palm are now normal. It's like having a twitch in your eye. It's habitual after a period of time. So the problem is how to bring somebody out of this habit? The best way is to reprogram them or remodel the experience of having their hand out in front of them without the fourth and fifth fingers curling. You can place a bell on top of their fourth or fifth finger. Every time the finger flexes the bell falls off. After a while they learn that the finger has moved to the wrong location. You can use a series of electrical devices which provide us with information about the muscle group that is flexing and extending the fourth and fifth fingers. The pianist can see on a screen how, as the fourth and fifth finger flexors are activated a lot of noise is produced. After a while they learn to control the noise by watching and by hearing. So they begin to control the fourth and fifth fingers. For most of us, simple acts like breathing or the placement of our feet as we walk, have become automatic. When you lose the ability to perform a simple act such as walking, one approach to re-training is biofeedback.

The group of people I have just been referring to present vexing problems to the doctor. Because they do not experience pain, they often let their problem linger before they go for help. By that time the problem has become ingrained.

One of the problems that we still face is that we don't have a sense a yet of what is normal. A pianist comes to us and tells us about what he cannot do. But we do not know what, in fact, he can do. This is an area in which we look for help from Professor Wanger.

There are a number of observations that I would make at this time. We've seen very few people who have trouble with their left hand. There seem to be only a limited number of ways that people hurt their hands. There are few thumb problems in comparison to the problems of the fourth and fifth fingers. So we are getting a general picture of the problems created in playing standard repertoire. All the rules that have been previously established are based on the styles of various famous pianists, whether they be Liszt, Chopin, Horowitz, etc. Little is known about ideal hand size or correct practice or warm-up or extended tendon movement. What are the warning signs of difficulties? One of the pianists we have seen studied with a famous teacher. After spending time with us he told us that he suspects that the teacher had planted a time bomb in the hands of the students he taught. He said that the teacher is prescribing certain exercises that are useful at the time but would be destructive fifteen years down the line. I don't know if this hypothesis is true, but the fact is, at this point in time, given what we know about a baseball pitcher's shoulder, and about pitching rotation, and about the problems that tennis players have using different kinds of rackets, and all we have learned about running shoes and about ski boots and bindings . . . knowing all of this it seems remarkable how little we know about the relationship of the body to the keyboard.

RJS: Is this the direction of your interest in the coming years?

Dr. Hochberg: Yes, but we need money. We need a piano here in our clinic. We need the machinery to work out the nature of muscle contraction. It is called a biofeedback-electromyographic machine. It costs about \$10,000.00. There are such machines here in the hospital but they are in constant use. Also, when the machine is used it should be in the hands of the same technician each time. Some people need treatment daily and it's not fair to have them wait for machines that are being used for other purposes. The third thing that we need is a person who can begin to analyze the nature of hand movements at the piano. This would be someone who is both a pianist and is trained to analyze hand movement. There are many ways to analyze hand movement but what I am talking about is to redo Ortmann's book. Working from Ortmann's premises we have to analyze such things as velocity, strength, what seems to be normal, efficient and inefficient hand positions and then to be able to say to pianists, "Look, this is what the Russian school has been teaching and here is an alternative".

RJS: I imagine you'd probably start with the extremes; what should not be done and then work toward those things that were acceptable.

Dr. Hochberg: Exactly. Also we would like to be able to tell pianists how to detect the warning signs for future difficulties. Ultimately we will need a computer that will be able to simulate the movements of the hand. With this machine the hand can be reproduced as a stick figure and then you can break the movements down so that you ought to be able to determine such

things as what can the fourth finger do in terms of movement when the fifth finger is held off the keyboard. And is that the same as when the hand is held, say, in ulnar-deviation?"

(Tax deductible contributions can be mailed directly to the Massachusetts General Hospital, Boston, MA 02114, care of Musical Medicine Fund).

QUESTIONNAIRE

This questionnaire has been designed to give us both a medical and musical profile. In answering the music related questions please be as precise as possible. Thank you.

Name..... Age.....
last first

Address..... Sex.....

Instrument/Instruments

Right or left handed..... Glove size.....

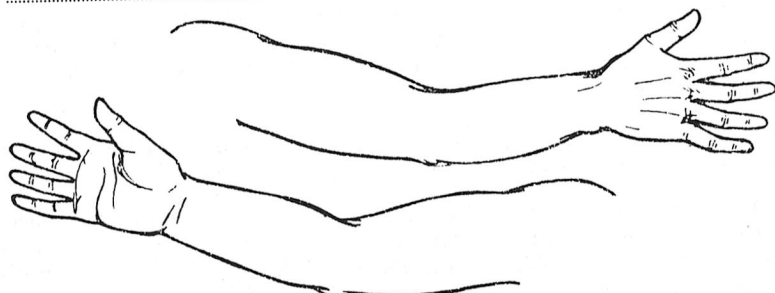
Schools, Conservatories and Universities attended.....

studies / years with each professor /

Names of major teachers

If you are a pianist, what is your stretch on the keyboard.....

Describe your general physical condition.....



Precise location of problem-indicate on figure by an X

Physical sensations associated with complaint:

- | | |
|-------------------------------------------|-------------------------------------------|
| <input type="checkbox"/> pain | <input type="checkbox"/> weakness |
| <input type="checkbox"/> fatigue | <input type="checkbox"/> tightening |
| <input type="checkbox"/> swelling | <input type="checkbox"/> cramping |
| <input type="checkbox"/> redness | <input type="checkbox"/> loss of control |
| <input type="checkbox"/> stiffness | <input type="checkbox"/> curling/drooping |
| <input type="checkbox"/> pins and needles | <input type="checkbox"/> other |

Have you ever suffered from:

- | | |
|------------------------------------|------------------------------------------|
| <input type="checkbox"/> stroke | <input type="checkbox"/> arm/hand injury |
| <input type="checkbox"/> seizure | <input type="checkbox"/> tumor |
| <input type="checkbox"/> paralysis | |

Were you ever diagnosed as having:

- | | |
|----------------------------------------------------|-------------------------------------------------|
| <input type="checkbox"/> tendinitis | <input type="checkbox"/> carpal tunnel syndrome |
| <input type="checkbox"/> nerve entrapment syndrome | <input type="checkbox"/> arthritis |
| <input type="checkbox"/> thoracic outlet syndrome | |

Therapy:

Medical

- | | |
|---------------------------------------------------------|----------------------------------------|
| <input type="checkbox"/> nonsteroidal anti-inflammatory | <input type="checkbox"/> physiotherapy |
| <input type="checkbox"/> drugs | <input type="checkbox"/> psychotherapy |

Surgical

location

- | | |
|----------------------------------------|-------------------------------------|
| <input type="checkbox"/> acupuncture | <input type="checkbox"/> myotherapy |
| <input type="checkbox"/> chiropractics | <input type="checkbox"/> other..... |

Please describe as best you can the manner in which you were taught to play the piano: (details)

Do you consider your pianism reflective of a particular school or method

If so, please specify

Is your repertoire predominantly from the:

- | | |
|----------------------------------|---------------------------------------|
| <input type="checkbox"/> Baroque | <input type="checkbox"/> Romantic |
| <input type="checkbox"/> Classic | <input type="checkbox"/> 20th century |

Do you sit either especially high or low at the piano.....

Length and frequency of practice sessions.....

Do you break up these sessions and if so how.....

Do you employ a high finger action or do you maintain contact with the key surface at all times

Do you precede repertoire work with purely technical study.....

List the titles of most used exercises

Do you concentrate on any of the following:

- | | |
|------------------------------------|----------------------------------------|
| <input type="checkbox"/> octaves | <input type="checkbox"/> scales |
| <input type="checkbox"/> arpeggios | <input type="checkbox"/> 3rds and 6ths |
| <input type="checkbox"/> trills | other..... |

Is your octave and chordal playing basically:

- | |
|-----------------------------------------------------------|
| <input type="checkbox"/> from the wrist |
| <input type="checkbox"/> combination of wrist and forearm |
| <input type="checkbox"/> from the forearm |

Describe how you attempt to increase speed and volume.....

When practicing repertoire, do you:

- | | |
|---------------------------------------------------|---------------------------------------------------------------|
| <input type="checkbox"/> practice slowly | <input type="checkbox"/> practice at normal volume |
| <input type="checkbox"/> practice at normal speed | <input type="checkbox"/> practice for endurance |
| <input type="checkbox"/> practice small units | <input type="checkbox"/> play through the piece several times |

If you concertize please indicate frequency of appearances

- | | |
|--------------------------------------------------|---------------------------------------------------|
| <input type="checkbox"/> 10-25 concerts per year | <input type="checkbox"/> 25-50 concerts per year |
| <input type="checkbox"/> 50-75 concerts per year | <input type="checkbox"/> 75-100 concerts per year |

Do you believe that a certain degree of pain is acceptable when attempting to overcome technical difficulties: yes ☐ no ☐

Have you undertaken any physical regimen or set of exercises to enhance your piano playing: yes ☐ no ☐ if yes, specify.....

Please send this questionnaire to: Dr. Fred Hochberg, Massachusetts General Hospital, Boston, MA 02114.

© Robert J. Silverman 1982.

practice - how when how long
repertoire -
warm-up / relaxation
technique

A COMPARISON OF THE EFFECTS ON MUSICAL PERFORMANCE OF TWO METHODS DESIGNED TO REDUCE SITUATIONAL ANXIETY

Ian James and Imogen Savage

Music often has to be performed under difficult and stressful conditions. The skill, coordination and judgement involved may all be adversely affected by excessive anxiety. The exact relationship between anxiety and the level of musical performance is a complex one. Initially, as some apprehension becomes manifest, performance improves. At a certain level of anxiety, performance reaches a peak for that individual. This level is set by the experience and training of the subject. If anxiety then increases further, the level of performance deteriorates. Excessive apprehension also causes a rapid heart beat, tremor, sweating and rapid breathing. Traditionally, sedative drugs have been used in an attempt to combat this type of anxiety and its adverse effects on performance. However, by causing undue sedation these drugs often lead instead to a deterioration in performance although admittedly anxiety is lessened.

More recently, drugs which block certain of the effects of adrenaline, those called beta blocking drugs, have been used to counter the adverse effects of stress on performance (James, Proceedings of the 1981 Conference; Brantigan, Proceedings of the 1983 Conference).

Both the tranquillizing drug Diazepam and the beta blocking drug Nadolol are thought to have an effect on anxiety. The tranquillizer has a direct effect on the brain, whereas the beta adrenoreceptor blocking drug's effect is indirect. By decreasing the peripheral effect of adrenaline i.e. on the pulse rate etc., anxiety decreases reflexly.

The object of the study was to compare the effects of the beta blocking drug Nadolol 40 mg with the tranquillizing drug Diazepam 2 mg on anxiety and the quality of musical performance in music students subject to stress of public performance.

Methods

Design. Young musicians, all string players were asked to give two short recitals each of 15 minutes on two separate days. They were able to choose the music themselves but each recital had to be identical. The players were divided into two groups. The first one is referred to throughout this article as the Diazepam group and the second as the Nadolol group.

The Diazepam Group. These subjects were given either Diazepam 2 mg on the first occasion and a dummy tablet on the second occasion or vice versa.

The Nadolol Group. These subjects were given either Nadolol 40 mg on the first occasion and a dummy tablet on the second occasion or vice versa.

Drug administration was randomised in a conventional way and the trial kept double blind throughout. It was impossible for a subject or an assessor to determine whether a subject was in the Diazepam or Nadolol group.

One of our distinguished musicians Yfrah Neaman, kindly agreed to act as an assessor. His help was particularly welcome because of his experience as Chairman of the Carl Flesch Competition. Michael McMurtary was the second assessor.

All recitals were video taped throughout by a professional camera crew and the interest of press, radio and television was actively encouraged and regulated so far as possible, to make all days of the study equally stressful.

Subject Selection

Thirty one young string players from the Music Section at Kingston Polytechnic and other Music Colleges in London volunteered for the study. They were not selected for undue nervousness.

The players were asked to attend at the same time on both of their days. No alcohol or coffee was allowed. Nadolol, Diazepam or matching dummy tablet was given at an appropriate time before each recital.

1. Pre-Performance Assessment

Subjects were rated for hand tremor, sweating, colour, talking and restlessness by a trained observer. They were also asked to rate themselves for heart thumping/beating fast, loss of concentration, blushing, feeling hot, sweaty hands, muscle tension, upset bowels, trembling, feeling detached and bladder disturbance.

A battery of sixteen visual analogue mood rating scales was given to subjects which included assessments of alertness, calmness and tenseness etc.

2. Musical Assessment of Performance

Thirty music variables were graded and grouped in such a way as to cover seven main areas of technique namely:—

Bow control (including bow wobble or bounce, bow direction, bow change and string crossing), left hand technique (including finger control and position changes), left hand-right hand coordination, intonation, tone, tempo, rhythm and dynamics.

3. Post-Performance Assessment

After the recital each subject was asked to rate his performance for the following variables:—

Intonation, expression, dynamics control, tempo control, position shifting, bow shake and tone forcing. They also rated their performance in comparison to their non-stressful rehearsal and assessed if they made lots of mistakes because of nervousness or lack of concentration.

Results

McNemar's Sign test was used for all scores except mood ratings, pulse and blood pressure readings when a simple Student t-test was employed.

Pre-Performance

A Observer Ratings

Subjects on Nadolol were significantly paler than those on dummy tablets. There was no overall difference observed in tremor between Nadolol and dummy. In the Diazepam group there were no significant differences in scores between active and dummy although there was a trend towards lower scores for talking and restlessness on Diazepam.

B Self Rating Physical Symptoms

There were no significant differences between dummy and active drug in either the Nadolol or Diazepam groups for any of the variables listed. There was a trend towards lower trembling scores for active drug in both groups. Trembling was usually less obvious on the second day. Heart thumping, sense of detachment, frequency and the presence of sweaty hands were also less marked on the second day.

C Self Rating Mood Scales

There were no differences of statistical significance between dummy and active medication in either the Nadolol or Diazepam groups. Interestedness scores tended to be higher on active Nadolol than on dummy. In the Nadolol group the subjects tended to rate themselves as overall more alert on Day Two. They also felt more attentive, proficient, energetic and quick witted on the second day. On the other hand they also felt more bored and less amiable on the second day whether they were on active drug or not.

Those in the Diazepam group had significantly higher scores for contentedness, tranquillity and feeling relaxed on the second day.

D Pulse and Blood Pressure Measurements

There was a significant slowing of pulse rate on Nadolol (approximately 15 beats per minute slower). The diastolic blood pressure did drop a little but changes in the blood pressure were not significant. There were no significant changes in pulse or blood pressure in the Diazepam group.

Musical Assessment

The most obvious differences between the various groups were for bow score. The sum of the four individual bow scores, bow wobble, bow direction, bow change and string crossing, was significantly better on Nadolol than on dummy tablet. No such difference was seen on Diazepam versus dummy tablet. There was also an improvement in left hand technique in those given Nadolol. Diazepam had no effect on left hand technique. Intonation tended to be better on Nadolol compared to dummy, and worse on Diazepam compared to dummy. The tendency for worse intonation on Diazepam occurred mostly on the second day. On the other hand there was a tendency for

rhythmic control to be worse on both active drugs. Dynamics tended to be more monotonous on active Nadolol, whereas on Diazepam, they tended to be better. Tempo and rhythmic control scores were usually better on Day One than Day Two for both groups.

Subjective Assessment

Subjects in the Nadolol group had significantly better scores for bow shake and dynamic control on active drug. They also rated tone forcing and tempo control as better on active drug although these differences failed to reach statistical significance. There were no significant drug effects seen for any of the variables listed in the Nadolol group.

Subjects in the Diazepam group had no significant differences in scores between active and dummy tablets. There was a tendency for them to rate themselves as better for bow shake, tone forcing, dynamics and tempo control.

Self rating in relationship to the last performance failed to show any significant differences in scores between active drug and dummy in either Diazepam or Nadolol groups. Similarly, there was no difference in scores between active and dummy in either Diazepam or Nadolol groups for the number of mistakes made or for their cause (i.e. excessive nervousness or lack of concentration):

Discussion

The finding of significant pulse rate reductions on Nadolol and the tendency for systolic blood pressure to be lower was expected. Similar results were reported by us with two other beta blockers Oxprenolol and Pindolol.

The failure to demonstrate an anxiolytic effect with Nadolol would have been much more significant had one been able to have demonstrated such an effect with Diazepam. Whilst there is every reason to suspect that this beta blocker as with Oxprenolol, Propranol and Pindolol has an anxiolytic effect, it was not demonstrated on this occasion. The failure of Diazepam to have had such an effect may be in part due to the small dose employed.

As in our previous study, the greatest beneficial effect of beta blocker was seen on bowing. This was appreciated by the musicians and confirmed by the judges' scores. This can almost certainly be ascribed to an abolishment of tremor by the beta blocker.

As in previous studies, the players subjectively had as much trouble with intonation whether they were on beta blocking drug or not, but objectively, the beneficial effect of Oxprenolol on intonation previously described was again seen with Nadolol.

Thus whilst these variables of bowing and playing in tune improved on beta blockers, there was a tendency for rhythmic control and dynamic control not to be as good. By decreasing anxiety too much, one may possibly decrease some finer aspects of performance.

Results

McNemar's Sign test was used for all scores except mood ratings, pulse and blood pressure readings when a simple Student t-test was employed.

Pre-Performance

A Observer Ratings

Subjects on Nadolol were significantly paler than those on dummy tablets. There was no overall difference observed in tremor between Nadolol and dummy. In the Diazepam group there were no significant differences in scores between active and dummy although there was a trend towards lower scores for talking and restlessness on Diazepam.

B Self Rating Physical Symptoms

There were no significant differences between dummy and active drug in either the Nadolol or Diazepam groups for any of the variables listed. There was a trend towards lower trembling scores for active drug in both groups. Trembling was usually less obvious on the second day. Heart thumping, sense of detachment, frequency and the presence of sweaty hands were also less marked on the second day.

C Self Rating Mood Scales

There were no differences of statistical significance between dummy and active medication in either the Nadolol or Diazepam groups. Interestedness scores tended to be higher on active Nadolol than on dummy. In the Nadolol group the subjects tended to rate themselves as overall more alert on Day Two. They also felt more attentive, proficient, energetic and quick witted on the second day. On the other hand they also felt more bored and less amiable on the second day whether they were on active drug or not.

Those in the Diazepam group had significantly higher scores for contentedness, tranquillity and feeling relaxed on the second day.

D Pulse and Blood Pressure Measurements

There was a significant slowing of pulse rate on Nadolol (approximately 15 beats per minute slower). The diastolic blood pressure did drop a little but changes in the blood pressure were not significant. There were no significant changes in pulse or blood pressure in the Diazepam group.

Musical Assessment

The most obvious differences between the various groups were for bow score. The sum of the four individual bow scores, bow wobble, bow direction, bow change and string crossing, was significantly better on Nadolol than on dummy tablet. No such difference was seen on Diazepam versus dummy tablet. There was also an improvement in left hand technique in those given Nadolol. Diazepam had no effect on left hand technique. Intonation tended to be better on Nadolol compared to dummy, and worse on Diazepam compared to dummy. The tendency for worse intonation on Diazepam occurred mostly on the second day. On the other hand there was a tendency for

rhythmic control to be worse on both active drugs. Dynamics tended to be more monotonous on active Nadolol, whereas on Diazepam, they tended to be better. Tempo and rhythmic control scores were usually better on Day One than Day Two for both groups.

Subjective Assessment

Subjects in the Nadolol group had significantly better scores for bow shake and dynamic control on active drug. They also rated tone forcing and tempo control as better on active drug although these differences failed to reach statistical significance. There were no significant drug effects seen for any of the variables listed in the Nadolol group.

Subjects in the Diazepam group had no significant differences in scores between active and dummy tablets. There was a tendency for them to rate themselves as better for bow shake, tone forcing, dynamics and tempo control.

Self rating in relationship to the last performance failed to show any significant differences in scores between active drug and dummy in either Diazepam or Nadolol groups. Similarly, there was no difference in scores between active and dummy in either Diazepam or Nadolol groups for the number of mistakes made or for their cause (i.e. excessive nervousness or lack of concentration).

Discussion

The finding of significant pulse rate reductions on Nadolol and the tendency for systolic blood pressure to be lower was expected. Similar results were reported by us with two other beta blockers Oxprenolol and Pindolol.

The failure to demonstrate an anxiolytic effect with Nadolol would have been much more significant had one been able to have demonstrated such an effect with Diazepam. Whilst there is every reason to suspect that this beta blocker as with Oxprenolol, Propranol and Pindolol has an anxiolytic effect, it was not demonstrated on this occasion. The failure of Diazepam to have had such an effect may be in part due to the small dose employed.

As in our previous study, the greatest beneficial effect of beta blocker was seen on bowing. This was appreciated by the musicians and confirmed by the judges' scores. This can almost certainly be ascribed to an abolishment of tremor by the beta blocker.

As in previous studies, the players subjectively had as much trouble with intonation whether they were on beta blocking drug or not, but objectively, the beneficial effect of Oxprenolol on intonation previously described was again seen with Nadolol.

Thus whilst these variables of bowing and playing in tune improved on beta blockers, there was a tendency for rhythmic control and dynamic control not to be as good. By decreasing anxiety too much, one may possibly decrease some finer aspects of performance.

Intonation tended to be generally worse on Diazepam but particularly so on the second day. There was also a tendency for tempo and rhythm to be not as good on drug. Thus we would advise caution about the use of Diazepam in such circumstances.

The results of the present study and those cited above confirm the beneficial effects of beta blocking drugs on musical performance. On the other hand there would seem to be no place for tranquillizing drugs. The question of whether beta blockers should be used in such and other similar circumstances is another matter. The present authors agree with Brantigan (1983 Conference proceedings) on this matter. For performers who are so incapacitated by anxiety that their livelihood is in jeopardy, beta-blocking drugs have an invaluable role to play. Ideally however they should only be used as a life line until long term strategies for help can be worked out. As small a dose as possible should be prescribed. An argument can also be advanced for the use of beta blockers in isolated episodes of severe acute stress such as during a major recital or audition. Their use alone however is by no means the complete answer for the treatment of situational anxiety.

Department of Clinical Pharmacology,

Royal Free Hospital, London.

© Ian James and Imogen Savage 1983.

THE ALEXANDER TECHNIQUE— ITS RELEVANCE TO PERFORMANCE

Nelly Ben-Or

I have always found it a challenging, yet somewhat frustrating task, to write about the Alexander Technique, because the greater my experience, the more I feel inclined to agree with the ancient saying

“the way that can be told is not the real way;
the word that can be spoken is not the real word”.

Yet I have learnt the Technique and have been teaching it to others for many years now. Perhaps to say one ‘teaches’ the Alexander Technique is not quite accurate. I would rather say that one guides a pupil towards a gradual but direct personal experience of the essence of it. Although I am a pianist, it was from the work of a complete outsider to the world of music that I have learned much that has influenced my approach to the art of piano playing and performing.

After years of formal training as a pianist and having gained experience of several different but well established methods of piano playing, I came across the work of Frederick Mathias Alexander—an educator in the widest sense of the word—who directs one’s attention to the person as a psycho-physical whole. Alexander’s teaching (known simply as the Alexander Technique) bears no specific relation to performance, whether of music or anything else. It has however a great deal to offer in the development of any individual’s potential, often enabling him to increase his ability in various fields of activity and certainly it has much to contribute to the art of piano playing.

As a concert pianist and teacher of both the piano and the Alexander Technique, I would like to share with the reader some of the knowledge and experience I have gained so far. The Alexander Technique is not yet another specific instrumental method—one more to add to the many existing ‘schools’ of piano playing for instance—with their various approaches and exercises. All these direct the player’s attention to one or more separate parts of the mechanism of piano playing without requiring him to consider these details in the context of himself as one indivisible whole. It is precisely this ‘wholeness’ of the player that should embrace and indirectly modify his approach to playing.

With the learning of the Alexander Technique, each detail will acquire a new quality, another dimension of freedom and unity of the whole person playing. It is therefore possible for a pianist of any technical schooling to gain much from the application of the basic principle underlying Alexander’s teaching. Furthermore, this principle is equally valuable and applicable to other forms of artistic performance, whether in music, dance or drama, although as a pianist I understandably stress its relevance to piano playing.

Before explaining what Alexander’s teaching is, it may be of interest to learn who the man was and what led to the evolution of his Technique. F. M. Alexander was born in Tasmania in 1869 and died in England at the

age of 86. From early childhood he was intensely interested in poetry and by his late teens had established a considerable reputation as a reader of poetry and professional status as an actor. It was while engaged in this work in Melbourne, at the age of about 19, that he encountered the problem that was to occupy him through the next ten years or so and which would ultimately determine the direction of his life. The difficulty he developed was a tendency for his voice to fail during recitals. When the trouble began, he went to doctors for help, but the medical treatment afforded only temporary relief. In time, his condition became so aggravated, that Alexander could not bring himself to accept engagements as he felt uncertain of being able to get through a full evening of reading. The climax was finally reached, when he lost his voice halfway through an engagement which he regarded as being particularly important to his career. Since his doctors found no medical reason for his loss of voice, Alexander concluded that it must be something **he** was doing which brought about this disastrous result. It was that idea which prompted him to embark upon a period of most careful and exacting observation of the way in which he used himself, particularly in the act of speaking. In the end, he found this out and a great deal more besides.

During the course of these years of painstaking trial and error, through observation of himself and others, Alexander discovered that there is a certain interaction between the head, the neck and the back, which determines the quality of our functioning as a whole. He termed it 'The Primary Control'. He also observed that this Primary Control has a direct influence on the quality of any activity we engage in. Simple routine movements such as walking, sitting or standing, as well as more complex activities, for example, dancing or playing an instrument, became infinitely more effortless and light when one learns to do them without interfering with the subtle freedom in the head and neck and back interaction: the Primary Control. Alexander has pointed out that after early childhood, there develops in almost each one of us an accumulative wrong use of ourselves. This could best be described as a tendency to collapse the body structure—particularly the back. This collapsing interferes with the finer balance of the head-neck-back relationship and so lowers the standard of our total co-ordination.

Alexander found that it was this habitual unconscious misuse of himself that caused him to lose his voice and that a conscious change of posture eradicated the problem completely. He also found that this downward pull and collapsing can be the cause of a variety of symptoms such as headaches, backaches, asthmatic conditions or a general lack of suppleness and lightness which is so necessary for instance in playing an instrument). It is also a potent factor in states of depression and psychological tension.

To eradicate these faults, Alexander evolved a technique which initiates the process of freeing the neck and releasing the head in a slightly forward and upward direction from the neck, to encourage in turn, a lengthening and widening effect on the back. This results in a progressive releasing of accumulated, unnecessary tensions and brings about an effortlessness and lightness in one's performance not hitherto experienced.

Since this technique aims at changing our fundamental reactions and habits of behaviour, we are taught first of all, the ability to stop these habitual responses and gradually replace them by new, consciously directed ones. Lessons in the Alexander Technique are concerned with helping the pupil learn how to stop 'doing' things in the habitual way which obviously feels 'natural'. The teacher is trained to communicate a change of alignment in the pupil's body through very gentle and skilfully guided touch, while the pupil's task is only to give mental directions relating to it. These directions are: to let the neck be free, to let the head be released forward and up and to allow a lengthening and widening of the back. As the pupil turns his attention to these 'directions', the teacher's hands bring about the corresponding effect in him.

All this happens on a very precise but subtle level of sensory experience. When the meaning of mental 'directing', as opposed to physical 'doing', is understood and experienced, the pupil may be guided through a chosen activity while maintaining the same 'directions', so that the freedom which they produce is sustained throughout the activity. In other words, the quality of openness and lightness does not give way to the strain habitually involved in 'doing' things. If for example, one is sitting in a chair and mentally projecting the correct 'directions', the teacher will guide the sitter from that position, to the movement of getting up in such a way, that the effect of these 'directions' is not disturbed, (that is the freedom of the head-neck-back alignment), so long as the person's attention remains with the continuity of 'directing' not only before, but also during the act of getting up. Anyone who has experienced this, will invariably react with amazement at the effortlessness of such a movement. I am of course trying to put into words a direct experience and this is attempting the impossible, like describing colour to the blind. A description can only tell us about the existence of something: what it really is, can only be perceived by personal experience.

At the root of the Alexander Technique lie the following steps:

- (1) learning to stop one's usual reactions—not through suppression but rather through a conscious refusal of allowing them to take place. Alexander called this the "inhibition of habitual reaction";
- (2) giving conscious mental directions to bring about the most balanced state in the 'primary control' of our total co-ordination, that is, allowing a freedom of the neck, the forward and upward releasing of the head and in consequence a general upward releasing of the torso. In Alexander's own words these mental directions are "to let the neck be free, to let the head forward and up, to allow a lengthening and widening of the back";
- (3) proceeding with any required activity **while maintaining** this consciously directed condition.

Such procedures lead to a profound change in how one functions and gives an experience of unity, ease and clarity.

It takes a course of lessons to guide towards a clearer awareness of the way in which one uses oneself as a whole in any situation of daily living and in relation to any activity. Walking, sitting down, getting up, moving an arm, speaking—in fact the whole range of automatic or semi-automatic

activities—improve their qualities when the Primary Control of the person is functioning well. Every aspect of the use of oneself gains mental and physical subtlety and is relieved from undue tension, which is conventionally accepted as being unavoidable.

In piano playing—my particular field of interest—it soon becomes apparent that much tension is usually bound up with strain, effort and undue waste of energy. This can bring about physical and mental fatigue and discomfort, which are obvious hindrances in performance. From even very accomplished performers, it is quite common to hear complaints of physical aches as well as mental strain in practising and indeed performing.

An Alexander-teacher can show a pianist, for example, that merely moving his hands towards the keyboard can cause a locking of the head, neck and back which then increases when playing begins. Part of the reason for this may often be that the player has insufficient knowledge of the text of the music. This, combined with so-called technical difficulties which sections of the music may present, will become a real stumbling block in practising and build up totally avoidable tensions and problems.

By learning to incorporate into the mechanics of piano playing an improved use of the whole person, the pianist gains freedom and ease in playing. In practical terms, this means that everything in piano playing, from the movements of the hands towards the keyboard right through to the activity of the fingers in playing, can happen in such a way as not to interfere with the state of freedom between the head, neck and torso, so that a balanced co-ordination of the whole player is undisturbed. This can only be achieved through a thorough change in one's attitudes towards ways of doing things generally.

A performer whose use of himself is well balanced, will not be disturbed by undue tension of the kind which is the result of effort and strain. He can of course choose to create tension deliberately, but that can be controlled and released at will. This kind of tension is not disruptive to performance because it does not just happen, but is used for a specific reason. I would prefer to call it intensity, or an increase in the flow of energy. However, the term is immaterial. What is important, is the fact that within each one of us, there exist sources of energy which can be used constructively and can be channelled, so that a great deal of usual mental and physical stress and strain can be avoided, not only in artistic endeavours, but also, in all aspects of daily living.

The freedom from disruptive tensions which the Alexander Technique affords can bring great relief and technical help. Furthermore, for any artist the self-knowledge which one can arrive at through the Technique would seem to be of inestimable value.

Guildhall School of Music and Drama, London.

© Nelly Ben-Or 1983.